pipes, that if we remove the whole of the skins or sides of pipes, which separate fluid from fluid and which are all therefore necessarily in perfect equilibrium, the forces acting on the remainder, namely, on those skins which are in contact with the surface of the body, forces which therefore may be considered as acting simply upon the body, must also have no endways sum total.

THE MELBOURNE OBSERVATORY

THE Board of Visitors to this Observatory made its annual visitation on June 2, 1875. Mr. Ellery, the Government Astronomer, having obtained leave of absence, the Board found the staff of officers and all the instruments in charge of Mr. White, in whose management it unhesitatingly expresses its fullest confidence.

The buildings and instruments are in good condition, and several new and important instruments have been added to the establishment during the period under notice. These include a photo-heliograph from Dallmeyer, of London, who constructed it under the advice of Dr. Warren de la Rue; an equatorial refractor of eight inches aperture, made by Troughton and Sims, under the advice of Sir George Airy; a portable equatorial, of 4½ inches aperture, by Messrs. Cook and Son, of York; and a double-image micrometer by Mr. Browning.

The various publications of the Observatory are in a forward condition. The First Melbourne General Catalogue of 1,227 Stars, for the epoch 1870, was published early in October, in time to be distributed among the different parties charged with the observation of the transit of Venus, by whom its great utility was acknowledged.

The observatory staff had much work to do in connection with the observation of the transit of Venus, not only having to make the necessary preparations for observing the transit at their own stations, but also to assist with the requisite observations for finding the positions of the stations occupied by the different nations in that part of the world. The arrangements made by the Observatory were all that could be desired.

With regard to the ordinary work of the Observatory, Mr. White reports as follows:—

"The work with the transit circle has consisted of the usual standard stars for finding the time, and the position of the instrument; close circumpolar stars, low stars for refraction, stars with which bodies had been compared off the meridian, stars culminating with the moon, the moon itself, and stars whose places were required by outside observers for any special purpose.

"The numbers of the recorded observations are as follows:—R.A. observations, 2,064; P.D. observations, 1,150; Observations of error of collimation, 111; observations of error of level and nadir, 180; observations of error of runs of microscopes, 47; observations of error of flexure, 35.

"The state of the reductions is as follows:—

"R.A. observations up to date.

"P.D. observations.—The stars observed in 1873 are reduced with the exception of 212, which require the corrections to reduce them from their apparent to their mean places. Of the stars observed in 1874, 865 are wholly unreduced, 267 have the reductions applied as far as the refraction, 45 are reduced to their apparent places, and the remaining 45 are fully reduced. Of the stars observed during the present year, 184 are fully reduced, 46 are reduced to their apparent places, and 122 are wholly unreduced. . . .

"The magnetical and meteorological instruments are under the special charge of Mr. Moerlin. Absolute values of the magnetic elements have been made as usual once a month, and they are all reduced up to date. The photographic curves from the magnetographs, barograph, and thermographs, are developed on every alternate day, but as yet no general tabulation of them has been made; only occasional measures are taken from them for special purposes. The ordinary meteorological observations made at Melbourne and the different stations in the colony are reduced to date; the Monthly Records in Meteorology and Magnetism are prepared to the end of April, and are in the printer's hands; owing to press of work, however, in the Government Printing Office, the Records to the end of December 1874 only have as yet been received. The Yearly Report for 1873 is in hand, and that for 1874 will be prepared as soon as possible.

"The great telescope, under the especial charge of Mr. Turner, has been diligently worked during the last twelve months, except during the time that we were engaged in the special observations connected with the transit of Venus, when Mr. Turner took turns with Mr. Moerlin in observing the occultation of stars by the moon. In accordance with the strongly expressed opinion of the Board in the last Report, the work done has consisted principally of drawing the nebulæ, and mapping the neighbouring stars; ten of the nebulæ and clusters figured by Sir John Herschel have been carefully drawn, and the positions of the stars have been laid down from micrometric measurements. One nebula has been observed which is not to be found in any catalogue in our possession. Coggia's comet was examined on eighteen nights, and fifteen drawings of it obtained. A drawing of the nebula surrounding η Argus, with the stars accurately plotted in, made this year, shows no appreciable change when compared with the one made last year.

"Besides the occultation of stars by the moon, referred to before, and of which ninety-six were looked out for, and only fifteen observed, owing to the unfavourable weather of the time, a fine series of observations for positions of Coggia's comet was obtained by Mr. Ellery and myself; an observation of Encke's comet was also obtained during the present month; all of which, including the occultations, have been sent for publication to the *Astronomische Nachrichten*."

The Report concludes with a brief account of the results obtained at the four Government stations during observations of the transit of Venus.

PROF. PARKER ON THE WOODPECKERS AND WRYNECKS

ANOTHER admirable paper by Prof. Parker, exhibiting the same industry, successful elucidation of detail, and mastery of morphological principle that have characterised all his publications, appears in the recently-issued volume of "Transactions of the Linnean Society." It is chiefly devoted to an exposition of the palatal structures of the Picidæ and Yungidæ, made intelligible by the study of nestlings and young birds. The conclusions of Prof. Huxley in his paper in the "Proceedings of the Zoological Society" for 1867 are substantiated and placed on a broader basis; and thereby another chapter has been permanently added to the history of the connection between Reptiles and Birds. The assistance which scientific naturalists all over the world may render to necessarily sedentary students like Mr. Parker, by the preservation and transmission of young specimens of various ages, is nowhere more clearly manifested than in the paper now spoken of. Mr. Parker's study of Woodpeckers, both of hard and soft parts, dates from the year 1843; and the unpublished results of that labour, in the form of minutely-careful drawings, are still of considerable value for reference. Again and again the study was resumed, with somewhat unsatisfactory results, until the opportunity of dissecting young birds and of comparing them with southern species threw sufficient illumination on the difficult problem of their palatal structure.

An introduction to the paper serves to point out the proper relations between the zoologist and the embryologist. "Each kind of labourer," says Prof. Parker, "has the greatest need of the results brought out by the other: the patient dissector waits for the treasures supplied to him by the more mercurial taxonomist; whilst he, in turn, profits by the work of one to whom a single type may serve for the labour of a year or more. Yet both are learning to look beneath the surface of things, a growing knowledge of the types showing both that close kinship is often marked by great difference in outward form, and that it is easy to be beguiled by the external likeness of forms—*isomorphic*, indeed, but far apart zoologically."

A defence is made against those who would accuse the author, as well as Prof. Huxley, "of taking a narrow view of the bird-types, touching with the point of a needle some little tract, but unacquainted with and not able to appreciate the Bird as a whole." Such an accusation charges the broadest-minded men with possessing a cast of mind which would utterly disqualify them for the distinguished positions they hold. In the present case the exclusive description of the palatal structures is easily defended: for "that territory contains parts that have undergone the greatest amount of metamorphosis of any in the whole body of a high and noble vertebrate; and moreover, being in the bird the skeletal framework of the whole upper face, these parts are, as it were, an index of the amount of specialisation undergone by any particular type—the ruling determining structures that lead to all, and really demand all, the changes that take place in the rest of the organism."

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Breadth of view is indeed essential, if anywhere, in such an investigation as the present. A restricted insight and experience would fail to detect and to demonstrate the substantial unity of structure existing in the palate of Lizards and of Woodpeckers, still more to establish the more minute relationships between the Rhynchosaurian Hatteria and various members of the Woodpecker group. This is what has been done. The well-defined group of the Woodpeckers, including the sub-family of Wrynecks, is so connected by its embryonic and adult palatal structures with the Lizards, that the name "Saurognathæ" is to be substituted for the morphologically-unexpressive term "Celeomorphæ," applied to them by Prof. Huxley. Their palatal region is arrested at a most simple and Lacertian stage, whilst in other respects they are metamorphosed and specialised beyond any other kind of birds.

The characteristics of the Saurognathous type of palate may be summarised as follows:—Retention and ossification of trabecular cornua; great number and bilateral independence of the vomerine series of bones, some of which are azygous (vomers, septo-maxillaries, median septo-maxillary); absence of a distinct mesopterygoid, represented, however, by a long process; a dagger-shaped basipalatine between the right and left bones; absence of a distinct transpalatine; abortive development of maxillo-palatine plates, and presence of a distinct palato-maxillary on the left side only.

One of the most instructive specimens figured is *Picumnus minutus*, a woodpecker from Bahia, Brazil, of about the size of the Golden-crested Wren. In it the vomers retain in the adult the condition manifested in the young of the Green Woodpecker, and much resembling the vomers of Hatteria. In other respects it presents resemblances to various Passerines of its own zoological area; and from it the author's imagination is led down to extinct types in which the characters of the Hemipod, the low Passerine, and the Woodpecker were existent in one generalised form—a form and a type only a step or two above the Ostrich tribe.

Numerous hints are given in this paper which lead us to look with great interest for Prof. Parker's forthcoming paper on the Ægithognathæ (Passerines) in the Zoological Transactions; and we may fitly close this notice with a pregnant passage referring to the Ægithognathous palate, showing to what problems of surpassing import these researches are supplying an answer. "I have long been familiar with its more marked peculiarities; but its morphological importance dawned upon me when I saw that the parts of that complex face, so conjugated and so metamorphosed, were really built up of elements which had their true counterparts or "symmorphs" in the Snake. But the Snake does but repeat these parts from the Amphibia; and the Amphibia borrow them from the Cartilaginous Fishes, amongst the lowest of which, namely the Lamprey, may be found the fullest development, both morphologically and functionally, of cartilages that form the substratum of the most peculiar part of a sparrow's face."

NOTES

At the meeting of the Zoological Society, on Tuesday next, Prof. Huxley will read an important paper on the Anatomy of *Ceratodus* and *Chimæra*, and on the Classification of Fishes.

At the recent anniversary meeting of the French Geographical Society M. Maunoir, the General Secretary, gave a highly satisfactory report. The receipts of the Society exceed 70,000 francs; ten years ago they were only 28,000. The number of members admitted from the beginning of the year is about 350, and about 1,400 are now registered. The receipts from money taken at the doors of the Geographical Congress and from donations, amounted to 175,000 francs, and the expenses to 155,000; a sum of 20,000 francs remaining in the hands of the Society will be devoted to the publication of the congressional papers. The place of meeting of the next congress has not yet been decided upon; it will probably be St. Petersburg.

The *Daily Telegraph* publishes further details concerning Lieut. Cameron's expedition obtained from the Madeira correspondent of the paper. Cameron, it seems, intended to remain at Loando until an opportunity arrived for sending his men home round by the Cape to the East Coast. It is understood that the traveller has accumulated some very valuable geographical materials, besides a large amount of general scientific information. It appears that he followed a large river flowing out of Lake Tanganyika in a south-westerly direction, tracing its whole course till he came upon a new lake, which he named "Livingstone." From this body of water a second large river runs westward, which Cameron, having traced it for a considerable part of its length, believes to be the Congo. It would seem that he was unable to continue along the river on account of meeting with a tribe of hostile natives. He had to choose between fighting his way through these unfriendly natives, with the risk of losing all his journals and papers, or of taking a different direction. The latter alternative seemed preferable, and though it prevented the absolute verification of his important discovery he has personally no doubt that the stream flowing out of the Livingstone Lake and the Congo are one and the same.

The *Birmingham Gazette* understands that Sir Josiah Mason is about to make another very substantial gift to the new scientific college which he is now building at Birmingham. When the foundation-stone was laid in February last it was understood that the mere building of the college would cost 100,000*l.*, and Sir Josiah also transferred to trustees, as an endowment for the college, the piles of buildings in which his monster pen manufacture had so long been conducted. Now Sir Josiah is also about to hand over to the trustees the business itself, or rather the whole amount which he is about to receive for the concern, and which is expected to be about 100,000*l.* The whole of this sum, it is said, Sir Josiah intends to give to the college. The money will probably be invested in the names of the local gentlemen who have already been appointed trustees, and will form a permanent endowment for the institution.

A private gentleman, being about to make a voyage to the West Indies in pursuit of objects of interest in natural science, has arranged to avail himself of the companionship and scientific services of the Rev. H. H. Higgins, of Liverpool. He will probably be away about four months cruising about the islands, and he will take with him two gentlemen—one a draftsman, and the other a collector, from the William Brown Street Museum, Liverpool. The expedition is made expressly for observations and collections in zoology and botany, and Mr. Higgins will have an opportunity of carrying on dredging operations. Very advantageous terms have, we believe, been arranged as to the division of the treasures which will be the result of the voyage. Mr. Higgins will be glad to receive suggestions with regard to the work he is about to undertake.

The scientific public will be glad to learn that a movement has been set on foot to enlarge the existing Wigan Mining and Mechanical School, inaugurated eighteen years ago by Dr. Lyon Playfair, and now numbering nearly 200 evening students. At a public meeting held at Wigan on the 24th inst., attended by nearly all the colliery proprietors of the district, resolutions were passed, resolving to establish a permanent building with museum, laboratory, and all the appliances for giving a thorough technical education in Mining, Mechanics, Geology, Machine Construction, Steam, and Chemistry. Large subscriptions have already been promised, including 1,000*l.* from Lord Crawford and Balcarres, 500*l.* from Mr. Hewlett, the Managing Director of the Wigan Coal and Iron Company, who promise 125*l.* a year.

On Monday the Prince of Wales opened the new Zoological Garden at Calcutta, recently formed under the auspices of the Lieutenant-Governor of Bengal.

The Municipal Council of Paris has voted a handsome sum of money in support of the State Academies of Paris. The vote was carried by twenty-three against nineteen. The minority was composed of clericals who are opposed to the instruction given by Government, and ultra-republicans, who are opposed to the grant of any money for superior instruction.

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